

Algebraic expressions

Exam questions

Foundation and Higher tiers

Please write clearly in block capitals.

Name

Class

Teacher

Time allowed: 85 minutes

Materials

For this booklet you need a black pen, a pencil, a ruler, a rubber and a calculator for Section B.

Instructions

- Use black ink or black ballpoint pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided.
- **Section A** (questions 1 to 13): you must not use a calculator.
- **Section B** (questions 14 to 30): you may use a calculator.
- Do all rough work in this booklet. Cross through any work you do not want marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this booklet is 76.

Advice

- Read each question carefully.
- In all calculations, show clearly how you work out your answer.

For teacher's use

Q	Mark	Q	Mark
1		16	
2		17	
3		18	
4		19	
5		20	
6		21	
7		22	
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	
TOTAL			

Section A



You must not use a calculator

Do not
write
outside
the box

- 1 (a) Simplify $t + t + t + t + t$

Answer _____

[1 mark]

- (b) Circle the expression that is the same as $3 \times y \times y$

$6y$ $3y^2$ $(3y)^2$ y^3

[1 mark]

- 2 (a) Simplify $9m + 4 - 2m - 7 + n$

Answer _____

[2 marks]

- (b) Simplify $6g \times 2h$

Answer _____

[1 mark]

- 3 Tick one box in each row.

	Expression	Equation	Formula	Identity
$5(n - 2) = 5n - 10$	☐	☐	☐	☐
$8k - k^2$	☐	☐	☐	☐
$C = 25 + 12h$	☐	☐	☐	☐
$6w + 1 = 19$	☐	☐	☐	☐

[2 marks]

4 $a = 4$ and $b = -3$

(a) Work out the value of $6a - b$

Answer _____

[1 mark]

(b) Work out the value of $a^2 + 2ab$

Answer _____

[2 marks]

5 A café sells scones for s pence each and teacakes for t pence each.
Jonah buys 3 scones and 5 teacakes.

(a) Write an expression for the total cost, in pence.

Answer _____

[1 mark]

(b) Jonah pays with a £5 note.
Write an expression for his change, in pence.

Answer _____

[2 marks]

6 (a) Simplify $m^5 \times m^3$

Answer _____
[1 mark]

(b) Simplify $\frac{w^9}{w^3}$

Answer _____
[1 mark]

(c) Simplify $(h^4)^3$

Answer _____
[1 mark]

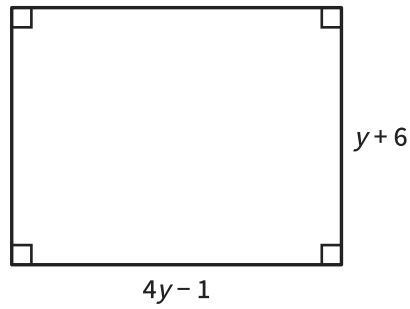
7 (a) Simplify $3a^2b \times 5ab^4$

Answer _____
[2 marks]

(b) Simplify fully $\frac{24x^6y^2}{6x^2y}$

Answer _____
[2 marks]

- 8 Here is a rectangle.
All lengths are in centimetres.



Not drawn accurately

Show that the perimeter of the rectangle can be written as $10(y + 1)$

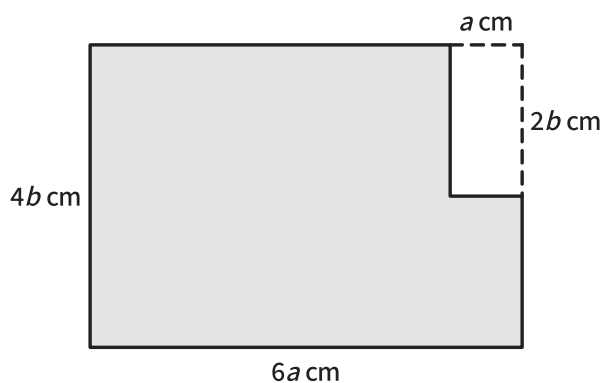
[2 marks]

- 9 Lena works out the value of $n^2 + 4$ when $n = -3$
She gets -5

Is Lena correct?
You must show your working.

[2 marks]

- 10** A rectangle measures $6a$ cm by $4b$ cm.
A rectangle a cm by $2b$ cm is cut from one corner.
The shaded shape is what is left.



Not drawn accurately

Write an expression for the area of the shaded shape.
Give your answer in its simplest form.

Answer _____ cm^2
[2 marks]

- 11** Kai says,
“ $(3x^2)^3$ simplifies to $9x^6$ ”

Is Kai correct?
You must show your working.

[2 marks]

12 $(x^n)^2 \times x^3 = x^{15}$

Work out the value of n .

Answer _____
[2 marks]

13 Simplify fully $(64a^6b^9)^{2/3}$

Answer _____
[2 marks]

Section B



You may use a calculator

Do not
write
outside
the box

14 $a = 6.35$ and $b = 4.8$

Work out the value of $5a - 2b$

Answer _____

[2 marks]

15 Complete the table for the expression $2.4n - 1.75$

n	1.5	3.8	-2.5
$2.4n - 1.75$			

[3 marks]

16 (a) Simplify $3.27a + 1.86a - 0.95a$

Answer _____

[1 mark]

(b) Simplify $2.5x \times 1.64y$

Answer _____

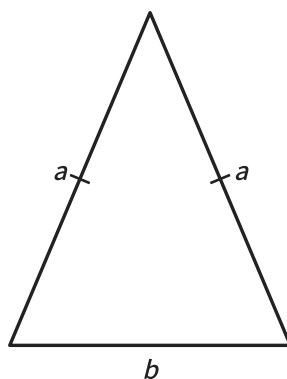
[1 mark]

17 Work out the value of $6 - 4x$ when $x = -2.35$

Answer _____

[2 marks]

- 18** Here is an isosceles triangle.
All lengths are in centimetres.



Not drawn accurately

- (a) Write an expression for the perimeter of the triangle.
Give your answer in its simplest form.

Answer _____

[1 mark]

- (b) $a = 6.85$ and $b = 5.37$
Work out the perimeter of the triangle.

Answer _____ cm

[2 marks]

- 19** Tom says,
“ x^2 is always bigger than $2x$ ”

Use $x = 1.85$ to show that Tom is wrong.

[2 marks]

20 $a = 12.6$ and $b = 0.45$

(a) Work out the value of ab

Answer _____

[1 mark]

(b) Work out the value of $\frac{a}{b}$

Answer _____

[1 mark]

21 Work out the value of $4\sqrt{t} - 1.6$ when $t = 13.69$

Answer _____

[2 marks]

22 Here is a number machine.

Input $\rightarrow$ $\boxed{\times 2.6}$ $\rightarrow$ $\boxed{- 0.75}$ $\rightarrow$ Output

(a) The input is x
Write an expression for the output.

Answer _____

[1 mark]

(b) The input is 4.35
Work out the output.

Answer _____

[1 mark]

23

A roll of ribbon is 12.5 m long.
Asha cuts k pieces from the roll.
Each piece is 0.35 m long.

- (a) Write an expression, in metres, for the length of ribbon left on the roll.

Answer _____

[1 mark]

- (b) Asha cuts 23 pieces.
Work out the length of ribbon left on the roll.

Answer _____ m

[2 marks]

- (c) Asha has a new roll of ribbon, also 12.5 m long.
What is the greatest number of 0.35 m pieces she can cut from this roll?

Answer _____

[2 marks]

- 24** (a) Work out the value of $x^2 + 3x$ when $x = -2.6$

Answer _____

[2 marks]

- (b) Kirsty uses her calculator to work out the value of $x^2 + 3x$ when $x = -2.6$
She gets -14.56
What mistake has Kirsty made?

[1 mark]

- 25** Show that $2x^2 + 1.5$ and $8x - 2.58$ have the same value when $x = 3.4$

[2 marks]

- 26** $n = 0.6$

Write these in order of size, smallest first.

$$\sqrt{n} \quad n \quad \frac{1}{n} \quad n^2$$

Answer _____

[2 marks]

- 27** Work out the value of $2(p - 1.4)^3$ when $p = 3.25$
Give your answer to 1 decimal place.

Answer _____

[2 marks]

- 28** Femi's phone plan costs £18.50 each month.
Each text he sends over his allowance costs an extra 4.8p.
In one month Femi sends t texts over his allowance.

- (a)** Write an expression for the cost, in pounds, of Femi's phone plan that month.

Answer _____

[1 mark]

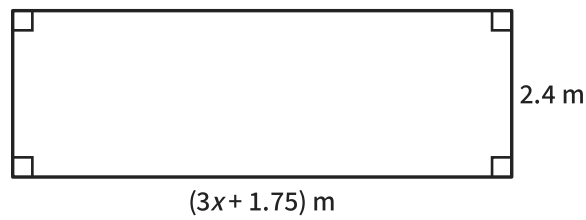
- (b)** $t = 137$
Work out the cost of Femi's phone plan that month.
Give your answer to the nearest penny.

Answer £ _____

[2 marks]

29

Callum is laying a rectangular patio.
The plan gives its measurements in metres.



Not drawn accurately

- (a) Show that the area of the patio, in m^2 , is $7.2x + 4.2$

[2 marks]

- (b) The patio covers 25.8 m^2
Find x .

$x =$ _____

[2 marks]

Do not
write
outside
the box

30 $a = 2.6$, $b = -4.1$ and $c = 0.7$

- (a) Work out the value of $\frac{3a^2 - b}{2c}$

Write down all the figures on your calculator display.

Answer _____

[2 marks]

- (b) Give your answer to part (a) to 1 decimal place.

Answer _____

[1 mark]

END OF QUESTIONS